EASY "MINIMUM" DEPTH SOLUTION FOR CANTILEVER SHEET PILING
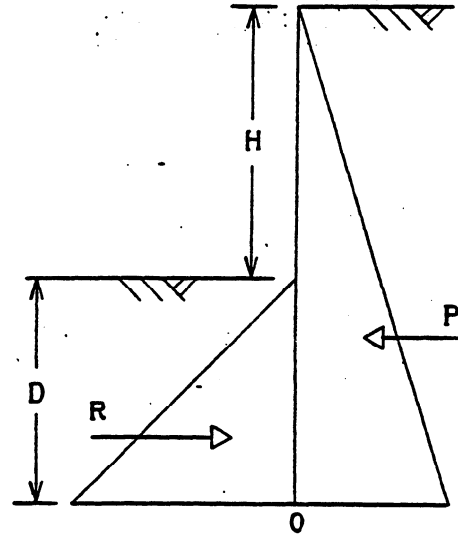
Solution for <u>minimum</u> calculated depth
of penetration.

This method does not include minimum
surcharge of 72 psf.

For level surface:

$$k_a = \tan^2(45° - \phi/2)$$

$$k_p = \tan^2(45° + \phi/2)$$

Determine moments about point o:

$$R\left(\frac{D}{3}\right) = k_p \gamma D \left(\frac{D}{2}\right)\left(\frac{D}{3}\right) = k_p \gamma \frac{D^3}{6}$$

$$P\left(\frac{H+D}{3}\right) = k_a \gamma (H+D) \left(\frac{H+D}{2}\right)\left(\frac{H+D}{3}\right) = k_a \gamma \frac{(H+D)^3}{6}$$

Equate moments about point 0:

$$k_p \gamma \frac{D^3}{6} = k_a \gamma \frac{(H+D)^3}{6}$$

$$\frac{k_p}{k_a} = \frac{(H+D)^3}{D^3}$$

$$\left(\frac{k_p}{k_a}\right)^{1/3} = \frac{H}{D} + 1$$

From which:

$$D_{MIN} \approx \frac{H}{\left[\left(\frac{k_p}{k_a}\right)^{1/3} - 1\right]}$$

(06/95)